

## Issue Paper Structural Sealant Glazing Systems

### ISSUE:

Provisions for use of Structural Sealant Glazing (SSG), which is currently not addressed in the building code, is added so that they will not be considered as an alternative system requiring structural design criteria.

### PROPOSAL:

Add 2013 CBC Section 2410 as follows:

#### **Section 2410** **Structural Sealant Glazing (SSG)**

**2410.1 General.** *The requirements of this section address the use of Structural Sealant Glazing (SSG). These requirements shall not be used for butt joint glazing, point supported glass, and glass fins.*

*Design, construction, testing, and inspection shall satisfy the requirements of this code except as modified in Sections 2410.1.1 through 2410.1.4.*

**2410.1.1 Design.** *Design of Structural Sealant Glazing (SSG) shall satisfy the following requirements:*

1. *SSG shall be waterproof and serviceable under design story drifts associated with the Design Earthquake and no glass fallout shall occur at the drifts determined by ASCE 7 Section 13.5.9.1 and AAMA 501.4 Section 11.3.*
2. *Insulated glass units used in SSG shall be designed in accordance with ASTM C 1249.*
3. *Allowable stress for SSG shall not exceed 20 psi and shall have a minimum factor of safety of 5 as required by ASTM C 1401.*
4. *Design methodology shall address seismic movement as required by ASTM C 1401 Section 30.3.4.*
5. *SSG systems shall be supported for self-weight and lateral loading at each floor level of the building.*
6. *Unitized SSG framing shall be anchored to the building floor bearing plate by screws or bolts and shall not rely upon gravity or frictional forces for attachment.*
7. *Framing shall satisfy the out-of-plane deflection requirements of this code.*

**2410.1.2 Testing and Inspection.** *Testing and inspection of Structural Sealant Glazing (SSG) shall satisfy the following requirements:*

- a. The seismic drift limits of structural sealant glazing shall be determined by tests in accordance with AAMA 501.6, AAMA 501.4 and ASCE 7 Section 13.5.9.2.
- b. The applicability of the specific AAMA 501.6 and AAMA 501.4 testing shall be subject to approval by the building official.
- c. The panel test specimens used in the AAMA 501.6 and AAMA 501.4 testing shall include all glass types (annealed, heat strengthened, laminated, tempered) and insulated glass units that comprise more than 5% of the total glass curtain wall area used in the building.
- d. AAMA 501.4 test specimen shall include the same materials, sections, connections, and attachment details to the test apparatus as used in the building.
- e. Serviceability tests of SSG test specimen shall be performed in accordance with AAMA 501.4 after seismic displacement tests to the design story drift.
- f. The structural sealant by different manufacturer/product category shall be qualified in accordance with AAMA 501.6 and AAMA 501.4 testing for the seismic drift required. Analysis as an alternative to testing is not acceptable for the purposes of satisfying the seismic drift requirements of the SSG system.
- g. Where unitized SSG is used with horizontal stack joints at each floor level and split vertical mullions that can move independently, only a story height single unit need to be tested under AAMA 501.6. Where continuous horizontal bands of SSG are used in the building, either two or four sided, the aspect ratio (height-to-length) of the test specimen shall be less than 1.0, contain not less than two interior vertical joints and all joints (vertical in the case of two sided), including the perimeter of the glass, shall be glazed with SSG.
- h. Where SSG continues around corners, the AAMA 501.4 test specimen shall include one corner panel to verify the kinematics of the corner condition under seismic drift.
- i. Quality assurance and inspection requirements shall include formalized post-installation tests using the Point Load Testing procedure in accordance with ASTM STP 1286. The Point Load Tests shall be done after the initial installation, then once every year for 3 years, not less than one test per elevation each time.
- j. Where the SSG is field assembled, hand pull tab tests in accordance with ASTM C1401 Section X2.1, one test every 100 linear feet, but not less than one test for each building elevation view shall be required.

**2410.1.3 Monitoring.** Short and Long term periodic performance monitoring shall be provided in accordance with ASTM C 1401, C 1392, and C 1394. Inspection frequencies recommended in ASTM C 1392 Section 5.1 shall be followed.

After every significant seismic event, where the ground shaking acceleration at the site exceeds 0.3g, or the acceleration at any monitored building level (if any) exceeds 0.8g, as measured by the seismic monitoring system in the building, the owner shall retain a

structural engineer to make an inspection of the SSG system. The inspection shall include viewing the performance of the panel, structural sealant, glass, reviewing the strong motion records, and a visual examination of the overall performance for deterioration, offset or physical damage. A report for each inspection, including conclusions on the continuing adequacy of the SSG system, shall be submitted to the enforcement agency.

**2410.1.4 Construction Documents.** Complete design of the SSG system for gravity, wind, and seismic forces shall be subject to review by the enforcement agency. Construction documents shall show structural details of glass and curtain wall system including:

1. A design narrative explaining how the SSG is supported by the building and the mechanism used to accommodate seismic racking.
2. Type of SSG and whether field or shop built.
3. The means of supporting the glass during structural sealant curing time shall be shown in the construction documents.
4. Typical curtain wall panel elevation, plan view, and sections.
5. Details of building corner joint to verify how the corner vertical mullion will move to accommodate the seismic drift.
6. Joints between panel and floors at top and bottom.
7. Joint between panels – including vertical & horizontal stack joints at intermediate and edge mullion.
8. Member sizes for curtain wall panels.
9. Glass pane sizes, thickness and type of glass.
10. Contact width of structural sealant and sealant materials for shop and field installation/re-glazing.
11. Glass to aluminum joints (including primers, if any).
12. Maximum roof/floor dead and live load deflection of the roof/floor framing members supporting the exterior curtain wall system.
13. Required seismic separation or gap distance between the structural sealant glazing curtain wall and other adjacent cladding units.
14. Mitigation of galvanic reactions between the roof/floor slab anchors, steel screw connections of aluminum sections and the aluminum anchorage components, if any.

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